•• REMARKS/ARGUMENTS ••

The Official Action of March 24, 2006 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

By the present amendment, claims 1 and 29 have been changed to more specifically recite the manner in which the power from the AC course is converted into stable DC power in order to energize and operate the EDI module so as to avoid problems associated with fluid temperature, fluid flow rate, fluid quantity, etc.

In addition, claims 11, 18 and 30 have been changed to depend from claim 1.

The limitations of claims 30 and 31 have been combined into claim 30.

Further, new claims 38 and 39 have been added.

Claims 1-5, 7-30 and 32-29 remain pending in the present application.

Claims 1-37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,190,528 to LI et al. in view of U.S. Patent No. 3,226,628 to Kupferberg et al. or U.S. Patent No. 5,532,894 to Sweaton.

The Examiner has relied upon Li et al. as disclosing:

> ...a known electrodeionization module using conventional DC to obtain purified water (see col. 3, lines 20-66).

The Examiner concedes that LI et al. "does not disclose the converting of the power from the AC source into stable DC power."

The Examiner has relied upon Kupferberg as showing:

> ... a conventional power interface for converting the AC into stable DC (see col. 2, lines 22-46). The reference further discloses limitations to the transformer, phase-controller and rectifier as claimed, with the amplifier (see figures 2-6 and columns 3-6).

The Examiner has relied upon Sweaton as showing:

> ... another conventional power interface for converting AC into stable DC (see abstract). The patent further discloses limitations to the transformer, phase-controller and rectifier as claimed with the amplifier (see figure 3-4 and columns 5-6).

In combining the teachings of the prior art the Examiner takes the position that:

> ....the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the disclosure of the Li patent with the teachings of the Kupferberg or Sweaton patents, because both the Kupferberg and Sweaton patents teach conventional power interface for converting AC into stable DC.

Li et al. discloses an electrodeionization module that uses conventional DC to obtain purified water (see col. 3, lines 20~66).

As conceded by the Examiner, LI et al. does not disclose converting of power from an AC source into stable DC power.

Kupferberg et al. teaches a circuit for converting the AC into stable DC (see col. 2, lines 22~46).

Sweaton also discloses a circuit for converting AC into stable DC (see abstract).

Kupferberg et al. generally relates to power control circuits for electrical devices, and more particularly to overvoltage protection circuitry that is particularly useful in overdriving light sources such as lamps of overhead projectors. As such, Kupferberg et al. is not considered to be particularly pertinent to the applicant's disclosed invention, or more importantly to LI et al.

Sweaton is concerned alternating current regulators and, in particular, servo motor regulators for providing regulators alternating current or voltage. As such, Sweaton is not considered to be particularly pertinent to the applicant's disclosed invention, or more importantly to LI et al.

As conceded, LI et al. does not disclose converting of power from an AC source into stable DC power.

More importantly, there is no teaching or suggestion in LI et al. that a stable DC power supply will enable the production of a stable quality water product.

Applicants' invention, as set forth in the specification, is directed to an electro-deionization (EDI) water producing apparatus that is adapted to transfer ions in a liquid under the influence of an electric field, and more particularly, to such an EDI apparatus that utilizes stabilized DC current.

The differences between applicants' invention and the known prior art is that applicants' EDI utilizes stabilizing DC current to obtain a stable quality water product as follows:

Generally, the deionization of EDI includes three processes:

(1) The ion exchange process between the ionizable species in the feed water and the ion exchange resin;

(2) The directional transfer process of the ion in the resin in the function of the direct current electric field; and

(3) The regeneration process of the resin.

The ionizable species in the water is first absorbed by the resin due to ion exchange, and then transferred to the membrane surface through the "ion transfer passage" formed by the resin particulate in conjunction with the electric field so as to be transferred into the concentrating chamber via permeating the ion exchange membrane. Polarization existing in the diffusible layer of the resin, membrane and water splits the water into H^+ and OH^-. The majority of the ions are used to regenerate the resin, However, a portion of the ions participate in the loading current, and then complete the three processes of the ion exchange, ion transfer, and electrical regeneration concomitantly, to achieve a continuous deionization process.

While loading DC voltage between the anode and the cathode of the EDI apparatus, the conductivity of the concentrate water increases constantly as the ions in the feed water are removed, and the current increases constantly under the same voltage load; whereas, if the concentrated chamber conductivity decreases the current decreases. So the operation current of the apparatus varies according to the variation of the concentrated water conductivity. Moreover the concentrate conductivity is directly affected by the feed water conductivity, temperature, and the feed flow rate.

When the operating current of the module raises, the degree of electrolysis of the water in the dilute chamber increases. This means that more H^+ and OH^- are produced, which causes the resin regenerate to be more effective, so that the product conductivity decreases. Whereas, if the current decreases, the degree of water electrolysis in the dilute chamber becomes weaken, and less H^+ and OH^- is produced, so that the effect of the resin regeneration is undesirable and the product conductivity will raise. In practical operation, salt is usually added into the concentrated chamber to increase the conductivity and to increase the operation current and improve the product quality.

If however the operation current is too high, and the water in the dilute chamber is split more acutely and produced overmuch H^+ and OH^-, in the dilute chamber, partial temperature in the surface of the resin and the membrane raises, causing undesired effects to the resin and the membrane. Meanwhile, is too much H^+ and OH^- is present (excessive for regenerating the resin) these ions will transfer and permeate the cation and the anion exchange membrane respectively. However, since the transfer rate of the H^+ is higher than the OH^-, a lesser amount of OH^- will be taken into the product water, causing the product conductivity raise and a decrease the produce quality. On the other hand, if the operation current is much higher, the operation power consumption of the apparatus will increase.

It is well known to the art, as mentioned above, EDI is a technique that removes ionizable species from liquids in an electrical potential to influence ion transport, and the electrical potential is provided by DC electrical power interface, but in the prior art, the electrical power

interface configuration merely uses simple bridge-type rectification. When energizing such EDI modules, unstable currents between the electrodes are experienced due to variances which include factors such as, but not limited to, unstable or fluctuating feedwater temperature, feedwater flow rate and feedwater quality. Unstable or fluctuating EDI module input voltage, variances in construction of EDI modules themselves, etc., result in unstable product water quality.

Accordingly, the object of the present invention is to solve the technical problems in the art by which the electric power system of EDI apparatuses cannot auto-adjust according to the variation of the operation status, which causes the product quality fluctuate.

The present invention provides an EDI apparatus with stabilizing DC power system, which can ensure that the apparatus operates stably to produce a stable product quality.

The goal of the present invention is to solve the technical problem that cause the EDI power systems (rectifying electrical circuit) in the art which otherwise cause instability and current fluctuations that are affected by the feed flow, temperature and so on in deionization process, and then caused the product quality unstable.

During operation, the stability of the external DC power is an important factor to the operation effect. The present invention provides a technical design to the EDI module, which can monitor and adjust the constant direct current timely, and then obtain stable product quality, which has "novel" technical effect, so the present invention is not obvious.

LI et al. does not recognize the problem associated with the prior art EDI devices and

certainly does not appreciate applicants' novel solution.

Neither of the secondary references to Kupferberg et al. or Sweaton suggest either the problem with EDI's as discussed above or the solution provided by the present invention.

Accordingly, the teachings of the prior art cannot be combined or relied upon in any manner to suggest or render obvious the present invention.

As held by the federal circuit in *In re Laskowski*:

> The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification. The prior art does not suggest applicants modification of the prior art, or provide any reason or motivation to make that modification. *In re Laskowski*, 10 USPQ 2d 1397 (Fed. Cir. 1989)

Moreover as held by the CACF in *In re Sernaker*:

> In order for a combination of references to render an invention obvious, the combination of the teachings of all or any of the references must suggest, expressly or by implication, the possibility of achieving further improvement by combining such teachings along the line of the invention, and that prior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantage to be derived from combining their teachings. *In re Sernaker*, 217 USPQ 1 CAFC 1983

In the present situation, the prior art simply does not suggest the benefits that are associated with applicants' invention, nor the solution to the problem which applicants alone have identified and solved.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is

respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a prima facie case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejection of the claims should hence be withdrawn.

Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

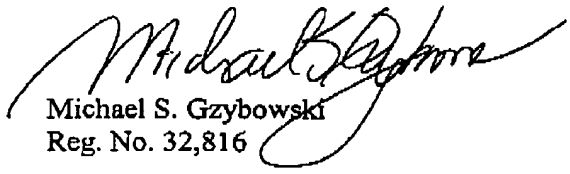
It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remain outstanding issues in the present application that could be resolved, the Examiner is invited to contact applicant's patent counsel at the telephone number given below to discuss such issues.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of

time fees, to Deposit Account No. 12-2136 and please credit any excess fees to such deposit account.

Respectfully submitted,



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